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Dear Mr Thorpe, Thyspunt Alliance and its members, the St Francis Bay Resident's Association and the St Francis Kromme Trust

**RE: ESKOM EIA CONCERNS FOR THE PROPOSED NUCLEAR POWER STATION AND ASSOCIATED INFRASTRUCTURE (DEA Ref. No: 12/12/20/944)**

**THYSPUNT ALLIANCE**

**NUCLEAR 1**

**RESPONSE TO SECOND DRAFT ENVIRONMENTAL IMPACT REPORT**

**APPENDIX E 26, SECTION 1.1**

**EMERGENCY PLANNING SPECIALIST REPORT**

Response compiled by H.Thorpe, and submitted on behalf of the St Francis Bay Residents' Association, the St Francis Kromme Trust and the Thyspunt Alliance

**Comment 1:**

1. The Achilles heel of the Thyspunt site

Eskom has been aware for years that emergency and disaster management planning are serious issues affecting the viability of the Thyspunt site. This goes back to the Nuclear Siting Investigation Programme of the early nineties and the resultant Kouga Coast Sub-Regional Structure Plan of 1998, both of which recognized that population expansion in the area threatened the viability of the site in terms of emergency planning requirements. What were not acknowledged at that time were the additional complications of wind speed & direction and the single escape route for five communities along ten kilometers of coastline. In combination these make disaster management planning a pipe dream for this area.

Eskom's method of getting around this hurdle is to change the rules, and lobby for more relaxed emergency planning requirements, which would eliminate the embarrassment of the vulnerability of the Greater St Francis community.

**Response 1:**

The sizes of the proposed emergency planning zones for Nuclear-1 are in line with current international emergency planning for Generation III nuclear power stations per EUR requirements.

Initial indications provided by the NNR are that it is likely that the EPZ will be reduced for newer generation plants, and possibly even for Koeberg Nuclear Power Station. For instance, in a presentation to the Parliamentary Select Committee on Economic Development on 1 June 2010, the Chief Executive Officer of the NNR stated the following: *"One major outcome of these new designs is that the emergency planning zones, specifically the Urgent Planning Zone, which is the zone within which evacuation of the public has to be catered for, would in all likelihood be reduced*

from 16 km in the case of Koeberg, to a much smaller radius which could fall within the property owned by the holder ...”.

#### RESPONSE FROM THE INDEPENDENT NUCLEAR SPECIALIST

What is stated is correct and the specific requirements will be confirmed as part of the NNR licensing process.

#### Comment 2:

##### 2. The Fukushima factor

It will be some time before the full details of the Fukushima disaster will be made public. The nuclear lobby will argue that this was a different technology from the modern PWR technology being proposed; that it was forty years old; and that the tsunami which hit it was far in excess of anything that had been anticipated.

However, at this stage, certain conclusions can be drawn. Briefly, these are that nuclear power generation remains a potentially hazardous activity; that nuclear contamination can be catastrophic, threatening life and health, and potentially rendering large tracts of land unfit for human habitation for decades, if not centuries to come; that, despite full knowledge of the tsunami risk, and the extensive safety engineering design incorporated by one of the most advanced engineering countries in the world, the system failed; that risk assessment in this case was too optimistic; that the accident was caused by failure of the defence-in-depth cooling system; that far greater transparency is required; and that there is a case for a complete review of the safety assumptions being used by the nuclear industry, as has been called for by most advanced countries.

A moratorium should be placed on all nuclear developments until the final outcome of the Fukushima disaster is known; lessons learnt from this disaster have been fully assessed; and plant design and safety features have been modified to accommodate these new insights.

In particular Fukushima has emphasized that there is no place for fragmented, superficial, inaccurate, incomplete or politically pre-determined impact assessments for such plants.

#### Response 2:

We take note of your comments. It was reported in the News on 18 Jan 2012 (NucNet) that; “About 30 workers at the Fukushima-Daiichi nuclear power plant in Japan received between 100 millisieverts (mSv) and 250 mSv of radiation exposure, which would have increased their chances of cancer by about 1% to 2.5 %, a parliamentary committee in the UK was told. Her Majesty’s chief inspector of nuclear installations, Mike Weightman, told the House of Commons Energy and Climate Change Committee that in terms of the workers, “there don’t appear to be any acute radiation effects”.

He said 30 of them have had “a significant dose”, but it is not in the sense of an immediate life-threatening dose. In a declared nuclear emergency, the recommended limit is 100 mSv. The International Commission on Radiation Protection is mandated to sanction a maximum accumulated dose of 250 mSv in extraordinary circumstances. Mr Weightman said public evacuation was well-organised and exposure countermeasures for the public have been “effective so far”, and there will be a longer-term health monitoring programme.”

The safety of the KNPS has recently been reviewed based on the events of Fukushima by the NNR . These checks included beyond design basis seismic ground motion and flooding as the initiating events. The evaluation by the NNR on the safety assessment done by Eskom concluded that KNPS

is able to withstand these events. It should also be noted that every two years the NNR tests preparedness of the various organisations involved in the Koeberg emergency plan

Furthermore several reports on the Fukushima accident have been circulated into the international nuclear community. This has allowed for proper investigations to be performed on existing plants, e.g. Koeberg. In this regard, responses to WANO and the regulatory bodies have been made, clearly indicating the areas of strength as well those requiring some gaps to be closed. The Nuclear-1 work in this regard will consider the accident causes and will ensure that these are addressed by the final plant design.

Lastly please see the Beyond Design Accident Report attached as Appendix E33 to the Revised Draft EIR Version 2.

**COMMENT FROM THE INDEPENDENT NUCLEAR SPECIALIST.**

Agreed - in addition both the initiating event scenarios, frequency and reactor design will all be different making direct comparisons potentially misleading - however lessons learned from the Fukushima event have been applied by the industry in order to identify reasonably practicable design modification in the beyond design basis region assessment of which will form part of the safety case assessment and licencing process by the NNR.

**Comment 3:**

3. Generation III nuclear power plants

It is repeatedly stated in the Draft EIR that Eskom favours the use of "Generation III" technology. This despite the fact that government some two years ago stated that this was unaffordable, and took over negotiations for the selection of the specific technology to be used. To this day this has still not been announced. The Emergency Planning Objectives in Appendix E26 take it for granted that Generation III will be used, and that EUR requirements will apply.

Definitions of Generation III technology can be found in Ch 3 "Project Description section 3.5, and Appendix E26, based on a document (NSIP-01344) prepared by Eskom on a framework for demonstrating that a proposed nuclear installation can be built in South Africa without the need for off-site short-term emergency interventions like sheltering, evacuation or iodine prophylaxis, in line with the European Utility Requirements (EUR) for a Light Water Reactor (LWR) Nuclear Power Plants. These documents prescribe that modern nuclear power plants should have no or minimal need for emergency interventions (e.g. evacuation) beyond 800m from the reactor, and provide a set of criteria that a reactor must meet in order to demonstrate that it can be built without such emergency planning requirements.

**Response 3:**

The EIA is conducted based on a set of enveloping parameters for the proposed nuclear power station. These enveloping parameters cater for the designs of modern nuclear power stations that are available in the world\ today referred to as Generation III reactors. Apart from approving IRP2010 which includes 9600MW of nuclear, Government has not as yet officially stated when the procurement process will commence.

**Comment 4:**

4. EUR Requirements

The EUR requirements can be summarized as follows:

- Minimal emergency protection action beyond 800m from the reactor during early releases from the reactor containment;
- No delayed action, such as temporary transfer of people at any time beyond approximately 3km from the reactor;
- No long-term action involving permanent (longer than 1 year) resettlement of the public at any distance beyond 800m from the reactor;
- Restriction on the consumption of foodstuffs and crops should be limited in terms of timescale and ground area, in order to limit the economic impact.
- It will be noted that this proposal derives from the European Utility Requirements, and not from either the International Atomic Energy Agency, or from any National Nuclear Regulator.
- The EUR regulations are the product of a joint exercise by twelve companies or organizations in Europe, all of which are involved in nuclear power generation. The prime motivation has to be promotion of the nuclear power industry, rather than protection of people and property. This is the responsibility of nuclear regulators, none of whom world-wide have recognized EURs for regulatory purposes.
- It will also be noted that nowhere in these regulations is it suggested that nuclear power generation has become inherently safe. It is accepted that some intervention may be required within the 800m zone; that people living within 3 kilometres of the plant may need to be evacuated; that it might be necessary to resettle people living outside the 800m zone, but not for more than a year; and that the economic implications of restricting consumption of foodstuff and crops should be taken into account.
- Obvious questions arising from this are the scientific basis for selecting 800m and 3 kilometres as the limits for emergency planning, and whether there is any conceivable event which could lead to the need for active intervention over a wider area, for example if the cooling system were to fail as at Fukushima.
- It is difficult to avoid the conclusion that this is a pure marketing exercise, to make it easier for utilities to obtain authorization to operate NPSs, and that the most optimistic attitude is taken towards risk and public safety.
- It is hardly surprising that to our knowledge, no Nuclear Regulator has endorsed these requirements.
- These requirements are in marked contrast to those imposed by the United States Nuclear Regulatory Commission, which are summarized in a Fact Sheet on Emergency Planning and Preparedness, released in March 2002, and reviewed & updated on 4 February, 2011.

#### **Response 4:**

The EUR aims at ensuring that the design that is adopted has minimal impact on the man and environment. This has been developed by utilities who will, in any case, have their design studied and endorsed by the relevant regulatory body. If the final design does not conform to the assertions made, the design will not be accepted and might have to be modified accordingly until it conforms to these requirements. Thus, the key emphasis of this requirement is to minimise the impact on man and environment. Eskom has chosen the EUR as this specification is sound and robust. It also allows for alignment with the international nuclear community. The Emergency Plan boundary allow for minimal restrictions around the site, while also providing for safer designs.

## RESPONSE FROM THE INDEPENDENT NUCLEAR SPECIALIST

Ultimately the emergency planning assumptions and plan basis will form part of the safety case to be considered by the NNR as part of the licensing process as such applicant's basis is being established however this must be independently verified as part of that process.

### Comment 5:

#### 5. United States Nuclear Regulatory Commission Requirements

The fact sheet lists details of the available documentation.

It recognizes the need for “reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.” Following the Three Mile Island accident, emergency planning was added to the “defence-in-depth” safety philosophy.

The “defence-in-depth” philosophy requires high quality in the design, construction & operation of nuclear plants to reduce the likelihood of malfunctions; recognizes that equipment can fail and operators can make errors, therefore requiring safety systems to reduce the chances that malfunctions will lead to accidents that release fission products from the fuel; and recognizes that, in spite of these precautions, serious fuel damage may happen, therefore requiring containment structures and other safety features to prevent the release of fission products off-site.

Despite all of this, the NRC demands that, in the “unlikely” event of a release of radioactive materials to the environment, there is reasonable assurance that actions can be taken to protect the population around nuclear power plants.

With this in mind, the following emergency planning is required, and remains so to this day:

“For planning purposes, the Commission has defined a plume exposure pathway emergency planning zone (EPZ) consisting of an area about 10 miles (16km) in radius and an ingestion pathway EPZ about 50 miles (80km) in radius around each nuclear power plant. EPZ size and configuration may vary in relation to local emergency response needs and capabilities as affected by such conditions as demography, topography, land characteristics, access routes etc”

These requirements are pretty well identical to those currently used for the so-called “Koeberg model”, which Eskom is now seeking to abandon. There is nothing in the US regulations to indicate that safety margins have increased to such an extent that EPZs can virtually be disposed of.

### Response 5:

Emergency Plan radii are defined by source terms that the plants are designed for, together with the potential accident scenarios modelled. Over the plant life several modifications are made to the plant, taking into account various experiences and risk study outputs. These allow for the reduction of public risk and may also inform the reduction of Emergency Plan radii. The new plant designs have taken into account the lessons learnt from the Operating Experience of plants in operation. These improvements have been incorporated on designs, and will also be reviewed by the NNR for soundness.

### COMMENT FROM THE INDEPENDENT NUCLEAR SPECIALIST.

It is correct that accident prevention incorporating defence in depth is the fundamental safety objective of any reactor design as demonstrated in the plant safety case - notwithstanding this regulators require that emergency plans based largely on procedural arrangements be put in place - as designs improve as required by the first objective inevitably and as a direct consequence of these improvements the risks are likely to reduce with a consequential reduction in the degree of emergency planning provisions - this must all be demonstrated via the safety case as part of the licensing process.

#### **Comment 6:**

##### 6. Contradictions

In a written response, dated 20 March, 2011, to submissions to the first Draft EIR by the St Francis Kromme Trust, the Environmental Assessment Practitioner, Jaana Maria Ball of Arcus Gibb, made the following comment (p.10, response 5):

"US regulations represent an important benchmark since there are at present no specific South African regulations regarding the licensing of nuclear power plant sites. Eskom therefore follows the regulations of the United States Nuclear Regulatory Commission (US NRC) which is considered to be the most stringent and detailed (and tested) set of regulations in the world. Also, by following US NRC regulations Eskom will also comply to IAEA regulations (which represent the second of the two sets of internationally accepted regulations used for the siting of nuclear power stations)".

It would be difficult to imagine a greater contrast between the EUR and the US NRC requirements. It is clear that Eskom is seeking to run with the hares and hunt with the hounds. While US requirements suit them, they are happy to conform, but when they do not, they seek other solutions, and present them as if they are internationally accepted criteria.

#### **Response 6:**

Best practices are employed where there is lack of clear guidance. This is not cherry-picking practices that suit Eskom. The best practices allow for incorporation of elements of importance in the analyses. It must also be noted that Eskom's choice of the best practices is not the end of the process. These practices are adopted, and then adapted for local conditions and the NNR has the ultimate authority to review and accept/reject the final proposal for the analyses performed.

#### **Comment 7:**

##### 7. Demand

In the context of the recent events at Fukushima, and of the conservative position being taken by the US NRC, which is supposed to be our benchmark, we demand that any proposal to move away from the US regulations, especially towards criteria which have been developed by the nuclear industry itself, be rejected out of hand.

The Thyspunt Alliance demands that this submission be included as a formal response to the second Draft EIR, and that the issues raised be addressed in full, not only by the EAP, but also by the Department of Environmental Affairs and the National Nuclear Regulator.

#### **Response 7:**

We take note of your demand for the Department of Environmental Affairs and the National Nuclear Regulator to respond to these issues. However, please note that the EIA regulations, under which



the public participation process for Nuclear-1 is being managed, it is the responsibility of the Environmental Assessment Practitioner to respond to comments by interested and affected parties. Such comments must be submitted to the environmental decision-making authority for consideration, but such authorities are not required to respond to such issues, besides applying their minds to the issues and responses and making a decision based on their evaluation thereof.

Yours faithfully  
for GIBB (Pty) Ltd

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Nuclear-1 EIA Team



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